

THE LETHAL HAZARD OF PRONE  
RESTRAINT:

POSITIONAL ASPHYXIATION

Note: When this report was originally published, we were known as Protection & Advocacy, Inc. (PAI). In October 2008, we changed our name from PAI to Disability Rights California.

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## I. INTRODUCTION

Protection & Advocacy, Inc. (PAI) has investigated a number of deaths or serious injuries sustained while the victim was restrained face down or prone. PAI's medical expert has concluded that these deaths or injuries were most likely caused by positional asphyxiation and, specifically, the prone restraint position. The issue of positional asphyxiation has been discussed extensively in the law enforcement community, particularly related to the hog-tie position (Chan, Vilke, Neuman, & Clausen, 1997, p. 579; Morrison & Sadler, 2001, p. 46; O'Halloran & Frank, 2000, p. 289; Paterson, Leadbetter & McComish, 1998, p. 62). Yet, little has been written in psychiatric and emergency response literature regarding the danger of death with persons restrained in the prone position (Mohr & Mohr, 2000, p. 288; O'Halloran & Frank, 2000, p. 50).

PAI releases this report as part of its ongoing educational efforts to:

- Improve the safety of people with disabilities;
- Publicize the hazards of prone restraint;
- Encourage health care professionals to eliminate the use of prone restraint and minimize prone containment; and
- Discuss the paradigm shift from viewing restraint and containment as a treatment intervention to a treatment failure.

PAI is an independent, private, nonprofit agency that protects and advocates for the rights of persons with disabilities. Under federal and state law, PAI has the authority to investigate incidents of abuse and neglect of persons with developmental and psychiatric disabilities. 42 U.S.C. §§ 10801 and 15001, et seq.; Welf. & Inst. Code §§ 4900, et seq.

## II. EXECUTIVE SUMMARY

PAI has conducted a number of investigations into serious injuries and deaths related to the use of restraints. These include 12 reports received by the Centers for Medicare and Medicaid Services (CMS) (formerly the Health Care Financing Administration) since August 1999, pursuant to regulations on Patients' Rights and Conditions of Participation for Hospitals in Medicare and Medicaid. 42 C.F.R. § 482.13(f)(7). Other deaths were reported anecdotally by members of the community. There is no mandatory reporting system in California regarding the consequences of restraint and/or seclusion use.

A number of these cases involved restraining the individual prone, either during containment or while mechanically restrained to a bed. PAI consulted with Werner U. Spitz, M.D., a forensic pathologist, board certified in Pathologic Anatomy and Forensic Pathology and an expert in excited delirium and positional asphyxia. Dr. Spitz concluded that the prone restraint position was a significant contributing factor in the demise of the individuals restrained. Literature shows that sudden death during prone restraint, particularly for those in a state of agitated delirium (a clinical syndrome described below), is not an uncommon phenomenon but one infrequently reported in medical literature. The mechanism of death is a sudden fatal cardiac arrhythmia or respiratory arrest due to a combination of factors causing decreased oxygen delivery at a time of increased oxygen demand.

PAI's investigations determined that prone is a hazardous and potentially lethal restraint position and likely contributed to the deaths or injuries of each of the individuals described in this report. Based upon its investigations, PAI recommends that:

- Individuals must never be placed in the prone position when restrained;
- Temporary prone containment should only be attempted when all other techniques are ineffective to prevent imminent serious harm and when there are sufficient safeguards in place to protect the individual from positional asphyxiation;
- Restraint and containment must be viewed as the result of a treatment failure, not a treatment intervention; and
- All first responders must be educated regarding the risks of positional asphyxiation with prone restraint.

### III. BACKGROUND

#### A. POSITIONAL AND RESTRAINT ASPHYXIA

Positional asphyxia is insufficient intake of oxygen as a result of body position that interferes with one's ability to breathe (Mohr & Mohr, 2000, p. 289; National Institute of Justice Program [NIJP], 1995, p. 1). Restraint asphyxia is a form of positional asphyxia that occurs during the process of subduing and restraining an individual in a manner causing ventilation compromise (Stratton, Rogers, Brickett & Gruzinski, 2001, p. 190).<sup>1</sup> As a consequence of the restraint application, respiration is compromised causing insufficient oxygen in the blood to meet the body's oxygen needs or demands (hypoxia) which then results in a disturbed heart rhythm (cardiac arrhythmia) (Paterson, et al., 1998, p. 62).

Research studies and the literature have suggested a combination of factors that place a person at risk of positional asphyxia. They include:

- position during restraint, particularly the prone position (Paterson, et al., 1998, p. 62);
- agitated delirium syndrome (O'Halloran & Frank, 2000, p. 48);
- obesity (Paterson, et al., 1998, p. 62);<sup>2</sup>
- prolonged struggle or physical exertion (O'Halloran & Frank, 2000, p. 49; Paterson, et al., 1998, p. 62);

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<sup>1</sup> Restraint application may involve mechanical restraints, meaning the application of a restraint device such as leather restraints, or physical restraint, meaning "hands-on" physically restricting a person's freedom of movement (Paterson, et al., 1998, p. 62).

<sup>2</sup> If a subject is obese, the excess fat tissue is forced upwards into the abdominal cavity, pressing on and immobilizing the diaphragm (Parkes, 2000, p. 40; Paterson, et al., 1998, p. 63). Further, excessive body weight makes it harder to move the chest wall and expand the lungs, especially while prone (O'Halloran & Frank, 2000, p. 49). Obesity may also contribute to the hyperthermia seen with agitated delirium by contributing to body insulation (O'Halloran & Frank, 2000, p. 49).

- drug and/or alcohol intoxication, in particular cocaine and methamphetamine intoxication or cocaine-induced psychosis (NIJP, 1995, p. 1; Stratton, et al., 2001, p. 191; O'Halloran & Frank, 2000);
- mania (Paterson, et al., 1998, p. 62);<sup>3</sup>
- respiratory syndromes, including asthma and bronchitis (Paterson, et al., 1998, p. 62);
- exposure to pepper spray (capsicum) (Paterson, et al., 1998, p. 62); and
- pre-existing heart disease, including an enlarged heart (hypertrophic cardiomyopathy) and other cardiovascular disorders (O'Halloran & Frank, 2000, p. 51; Paterson, et al., 1998, p. 62; Stratton, et al., 2001, p. 187).<sup>4</sup>

## **B. PRONE CONTAINMENT VS. PRONE RESTRAINT**

For the purposes of this report, PAI will distinguish between prone containment and prone restraint. Prone containment is the brief physical holding of an individual prone, usually on the floor, for the purpose of effectively gaining quick control of an aggressive and agitated individual. Prone restraint is the extended restraint (either physical or mechanical) of an individual. This may include holding an individual past the time of immediate struggle. It also includes restraint to a bed using restraint devices, such as leather cuffs.

## **C. AGITATED DELIRIUM**

Sudden deaths involving physical restraint have long been associated with a syndrome called agitated delirium (O'Halloran & Frank, 2000; Paterson, et al., 1998; Stratton, et al., 2001). Agitated delirium (also known as excited delirium or acute excited states) is a condition of extreme mental and motor excitement characterized by aggressive activity with confused and unconnected thoughts, hallucinations, paranoid delusions and incoherent or meaningless speech (Farnham & Kennedy, 1997, p. 1107; O'Halloran & Lewman, 1993, p. 292; O'Halloran &

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<sup>3</sup> Persons with mental disorders, especially drug-induced or psychotic illness-induced agitated delirious states, seem to be at greater risk (O'Halloran & Frank, 2000, p. 51).

<sup>4</sup> An enlarged heart renders an individual more susceptible to a cardiac arrhythmia under conditions of low blood oxygen and stress (NIJP, 1995, p. 2).



Frank, 2000, p. 48). Victims display extraordinary strength and endurance when struggling, apparently without fatigue (Farnham & Kennedy, 1997, p. 1107). Hyperthermia, or extremely high body temperature, is often part of this syndrome (O'Halloran & Lewman, 1993, p. 292; Paterson, et al., 1998, p. 62). Agitated delirium has been described in persons with psychosis, chronic schizophrenia, mania, and high blood concentrations of cocaine, methamphetamines or other stimulants (Farnham & Kennedy, 1997, p. 1107; O'Halloran & Lewman, 1993, p. 292; Paterson, et al., 1998, p. 62).

## IV. CASES SCENARIOS

### A. CRYSTAL M.

Crystal was a 16-year-old girl, diagnosed with mild mental retardation, major depression and an impulse control disorder. Crystal, a ward of the court, had been placed in a residential facility with an on-site school program for children with psychiatric disabilities. Crystal was 5 feet 8 inches tall, weighed 293 lbs and was diagnosed with obesity.

On the day of her death in February 1999, Crystal began arguing with another student in the school program. She was escorted by staff to the “*timeout room.*” A struggle ensued. Staff attempted to physically contain Crystal against a wall. As she continued to struggle, she complained that she could not breathe. She was lowered to the floor in a seated position and, ultimately, physically restrained prone on the floor. After 30 minutes on the floor, Crystal stopped struggling. Staff released their hold. When she failed to respond to staff’s request to adjust her pants, Crystal was rolled onto her back and found not breathing. Cardiopulmonary resuscitation (CPR) was performed but Crystal did not respond. She was pronounced dead when she arrived at the local hospital. The medical examiner found her cause of death as “*cerebral hypoxia due to positional asphyxia during physical restraint.*” Petechiae or petechial hemorrhages were found in both eyes.

### B. ANTHONY N.

In November 1999, Anthony N. was 40-years-old when he was taken to the local county psychiatric emergency services for evaluation. Earlier that day, Anthony had assaulted a customer at an automatic teller machine. He told law enforcement that he was hearing voices and believed he was Genghis Khan. He was 6 feet tall and weighed nearly 190 lbs.

Staff at the emergency department knew Anthony. He had been aggressive in the past when treated in the emergency department. So, although he was calm and cooperative at the moment, nursing staff requested that Anthony be placed in restraints, in anticipation of a struggle. Shortly after being escorted into the restraint room, Anthony became aggressive and combative. A struggle ensued. Anthony was finally secured to a restraint bed, prone, with leather restraint cuffs at each limb. Seconds later, Anthony appeared ashen. Staff could not find a pulse. The restraints were released and Anthony was turned onto his side. He was gasping for air. Staff initiated resuscitation efforts. He was intubated and revived but never

regained consciousness. Anthony remains in a persistent vegetative state. Doctors attribute his condition to severe anoxic encephalopathy resulting from the restraint.

### **C. SAM R.**

Sam R. was a 34-year-old male with a long history of mental illness and substance abuse. He had a criminal history and was found incompetent to stand trial on charges of assault. He was 5 feet 10 inches tall and, weighing 227 lbs, was considered obese.

On the day of his death in June 1999, Sam was transferred to a state hospital for persons with psychiatric disabilities. Later that evening, Sam refused to take his standing medications. Three staff members confronted him and told him that he would receive an injection if he continued to refuse to voluntarily take his medication. Sam again refused and then struck a “*fighting stance*.” He charged past staff and ran into another patient’s room. He then came out holding a large chair which he kept between himself and the nearly ten staff members who had assembled.

The staff charged at Sam. He was taken to the floor and physically contained in a prone position. Staff injected him with Haldol. Within minutes, Sam vomited and then stopped struggling and breathing. CPR was initiated but Sam was pronounced dead after arriving at the local hospital.

The coroner conducted an investigation. The cause of death was fatal cardiac arrhythmia. “*Stress-related cardiac arrhythmia (physical struggle) and possible compressional asphyxia and/or airway obstruction*” were listed as contributing causes of death. The autopsy found petechial hemorrhages in both eyes. In his comments, the coroner wrote:

*The fact that the subject was engaged in a physical altercation requiring several people to finally subdue subject, would result in a release of catecholamine substances which would likely have an adverse effect on the subject’s already abnormal heart<sup>5</sup> and predispose the subject to stress-related cardiac arrhythmia. Another*

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<sup>5</sup> The coroner noted that Sam had an enlarged heart (cardiac hypertrophy).

*possible contributing factor to the subject's demise would be compressional asphyxia, as it is noted that several people were required to subdue the subject in a prone position, and it is possible respiratory efforts may have been interfered with.*

#### **D. NORMAN H.**

Norman H. was a 35-year-old man with a long history of psychiatric difficulties. He was diagnosed with paranoid schizophrenia. He had a history of periodically not taking his medication. He was 5 feet 9 inches tall, weighed 322 lbs and was diagnosed with obesity.

Three days before his death in January 2001, Norman's mother contacted local law enforcement. Norman, who had been staying at his parents' home, had been acting bizarrely, urinating on the carpet, cutting his mattress and burning his furniture. He drove off in his parents' car and was reported missing by his mother. Norman's mother, his conservator, believed that he was gravely disabled and a danger to himself or others. She asked law enforcement to attempt to find Norman.

After locating him, law enforcement placed Norman on an involuntary hold for psychiatric evaluation, pursuant to Welfare and Institutions Code Section 5150. He was taken to the county mental health facility for crisis services (23 hour stay). He remained there for nearly three days, awaiting an available bed on an acute inpatient services unit. The crisis services unit was extremely overcrowded, at over twice its licensed capacity.

On the morning of his death, Norman became aggressive, attempting to strangle and punch a staff member. He was placed in 5 point leather restraints secured prone to the restraint bed. He was given an injection of Haldol and Cogentin. Minutes later when staff checked on Norman, he was cyanotic with no pulse. CPR was initiated but he was pronounced dead by paramedics at the scene.

The county coroner conducted an autopsy. He listed the cause of death as "*Probable Cardiac Arrhythmia due to Hypertrophic Cardiomyopathy.*"<sup>6</sup> His report included the pathologic diagnosis of acute manic psychotic episode followed by

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<sup>6</sup> The coroner diagnosed Norman with cardiomegaly (an enlarged heart).

restraint and sudden cardiovascular collapse. “*Rare conjunctival petechial hemorrhages*” were present in both eyes.

#### **E. LAURAJEAN T.**

Laurajean T. was a 47-year-old female in the summer of 1994 when she was last hospitalized for symptoms related to her psychiatric disability. In the preceding eight days, she had been sent twice to the county’s psychiatric emergency services for evaluation. Her thinking was disorganized and delusional and her speech pressured. At the conclusion of her second crisis evaluation, Laurajean was admitted for inpatient treatment. She was diagnosed with Schizoaffective Disorder, Bipolar Type. She weighed 286 lbs and was nearly 5 feet, 7 inches tall, considered obese. She was a diabetic with heart disease (including high blood pressure) and a pacemaker.

On the morning of her death, Laurajean was found in another patient’s room. When she was asked to leave, she became, “*very argumentative, shouting, ‘I’m not leaving, I’m tired, leave me alone.’*” She was directed to leave a second time, after which Laurajean picked up a leather “*combat-style*” boot and threw it at staff, striking one individual in the face. A struggle ensued with Laurajean swinging her fists. She was escorted by three staff members to the seclusion room and placed in 5 point leather restraints prone on a restraint bed. Laurajean complained, “*I can’t breathe.*” Staff turned her head to the side and then left her alone in the locked seclusion room.

Fifteen minutes later when staff returned to check on her, Laurajean was not breathing. Her pulse was faint. Staff initiated CPR. She was rushed to the local acute care hospital and was pronounced dead upon her arrival. The county coroner listed her cause of death as positional asphyxia.

#### **F. KEVIN M.**

Kevin M. was a 30-year-old man residing in a state hospital, dually diagnosed with schizophrenia and mild mental retardation. About three times a month, Kevin would exhibit assaultive behavior, generally triggered by delusional material and/or internal stimuli. He was 5 feet 8 inches tall, weighed approximately 193 lbs and was considered “overweight.”

On the evening of his death in May 1997, Kevin became agitated and combative after being told he would not participate in the unit's coffee social. He was redirected to his room where he slammed the door closed. Staff checked on Kevin moments later and found him lying flat on his back, quiet. † Due to the age of this death report, this case was not referred to PAI's medical expert for review. However, case facts and autopsy findings suggest this death was related to prone restraint.

Several minutes later, Kevin ran out of his room, pushing past staff in the hallway and knocking one to the ground. He ran about the unit, breaking two glass windows with his fist. Three staff members contained Kevin on the floor in the prone position. One staff member involved described to investigators using his body weight to contain Kevin. Other staff were summoned and quickly assisted in the restraint. Walking restraints were applied to Kevin's ankles. As staff moved to apply restraints to his wrists, Kevin was found not breathing. He appeared cyanotic. Kevin was rolled onto his back and CPR was initiated. He was rushed to the local emergency room where he was pronounced dead.

The county coroner conducted an autopsy. He listed the cause of death as "*Post Hyperexertional Exhaustion [sic] with Arrhythmia.*" The coroner made the following notation regarding the cause of death:

*At autopsy the deceased showed some probable evidence of hypoxia with petechiae in the eyes. The mechanism of death is probably related to cardiac exhaustion after the hyperactive state.*

## **G. RICK G.**

Rick G. was a 36-year-old man with a history of mental illness. He had been primarily living at home with his parents and receiving outpatient services from the local county mental health services agency. He was diagnosed with bipolar disorder, mixed, with psychotic features. Rick was 6 feet 2 ½ inches tall and, weighing over 330 lbs, was considered obese.

In the four months preceding his death, Rick had been admitted four times to the inpatient unit of the county psychiatric health facility. Two days after his third discharge from the facility, Rick was readmitted following reports of inappropriate

interactions with peers and staff at the residential program for persons with psychiatric disabilities into which he had just moved.

In the early morning hours of his death in November 1998, Rick entered a staff area of the facility and struck a male staff person, knocking him against the wall. With the assistance of eight staff members, including two security guards, Rick was taken to the floor, initially on his back, but was then turned to the prone position. His hands were raised to his throat in what staff believed to be an attempt to choke himself. “[Rick] struggled violently against staff throughout this time.... Legs and wrists were hobbled with leather restraints. [Rick] continued to struggle and scream.” His arms and legs were restrained in leather belts while he struggled face down on the floor. Staff injected him with Haldol and Ativan. Within minutes staff noted Rick’s breathing had become labored. He was rolled onto his back for further assessment. Rick’s lips were blue and he was without a pulse and was not breathing. CPR was initiated. Local paramedics transported Rick to the local hospital where he was pronounced dead.

The county coroner listed the cause of death as “*acute cardiorespiratory arrest during restraint for extreme agitation.*” A few petechiae were noted in the right eye.

## V. RESTRAINT ASPHYXIA

### A. VENTILATION AND THE EFFECT OF PRONE RESTRAINT POSITION

Ventilation in a healthy human involves two key factors: movement of the ribs by the intercostal muscles and movement of the diaphragm (Parkes, 2000, p. 40; Reay, Fligner, Stilwell, & Arnold, 1992, p. 94). The ribs expand and the diaphragm contracts, drawing air into the lungs (inhaling). The ribs and diaphragm then relax, releasing air from the lungs (exhaling).

When an individual is restrained or contained prone, two things happen that compromise the body's ability to breathe.

1. There is a compression or restriction to movement of the ribs limiting the individual's ability to expand the chest cavity and breathe (Parkes, 2000, p. 40; Stratton, et al., 2001, p. 190); and
2. The abdominal organs may be pushed up, restricting movement of the diaphragm and further limiting the available space for the lungs to expand (Parkes, 2000, p. 40; Reay, Fligner, et al., 1992, p. 95).<sup>7</sup>

So, even without any other contributing factors, simply restraining an individual prone restricts the ability to breathe, thereby lessening the supply of oxygen to meet the body's demands.

There is an even graver risk of causing respiratory compromise during the process of subduing and restraining an uncooperative individual (Stratton, et al., 2001). Agitation or an aggressive struggle further increases the body's demand for oxygen (O'Halloran & Lewman, 1993, p. 294). Energy expended during physical confrontations is subtracted from that available for respiratory muscle needs (Reay, Fligner, et al., 1992, p. 95). A shortage in energy to respiratory muscles can influence their performance (Reay, Fligner, et al., 1992, p. 95). Even after being secured to a restraint bed, an individual may continue to struggle against the restraints, incurring further oxygen demands (Parkes, 2000, p. 40).

Furthermore, during the struggle of subduing and restraining an individual, there is the potential for further compression and restriction of the chest by those

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<sup>7</sup> This phenomenon is exaggerated with obese individuals whose abdominal organs and abdominal walls are surrounded by extra layers of fatty tissue.



executing the restraint. To gain physical control of a struggling person, a knee or hand may be pressed into the back of the individual in prone position or staff may use their weight to lean into the individual's back or thorax (Stratton, et al., 2001, p. 190). This compression further limits the individual's ability to expand the lungs and breathe.

## **B. EFFECT OF RESPIRATORY COMPROMISE ON CARDIAC FUNCTIONING**

All of the body's muscles need oxygen to function, including the heart muscle. When the heart does not get sufficient oxygen, it beats faster, trying to circulate all available oxygen. Insufficient oxygen supply to the heart may cause an uncoordinated pattern of heartbeats, otherwise known as cardiac arrhythmia. The combination of a rapid heart rate and insufficient oxygen supply to meet the heart's oxygen demands may quickly cause a fatal cardiac arrhythmia. Researchers believe that cardiac arrhythmia is the cause of most unexpected deaths of restrained individuals, particularly those with agitated delirium (O'Halloran & Lewman, 1993, p. 294).

Research studies have shown that restraint position affects the time it takes an individual's respiratory and cardiac rates to return to resting values (otherwise known as recovery time). In one study, participants' recovery times were quicker when restrained in a face-up (supine) position compared to a prone position (Parkes, 2000). This finding was replicated with highly resistive subjects restrained in the prone position (Parkes, 2000).

Other researchers have concluded that factors other than body positioning are more important determinants of the sudden, unexpected deaths of restrained individuals (Chan, et al., 1997, p. 583). Most of these studies use healthy subjects (body mass index < 30kg/m<sup>2</sup>, negative urine toxicology screen) who have exerted themselves to a level carefully chosen for safety and who are not under the stress of fear or anger (Chan, et al., 1997, p. 579; Parkes, 2000, p. 43). Experts have challenged the findings from these studies, saying they fail to sufficiently replicate the conditions associated with restraint asphyxia. However, research of this type cannot reproduce the extreme physiological changes, psychological stresses, struggle and exhaustion of a prolonged real-life restraint (Morrison &

Sadler, 2001, p. 48). In a real-life scenario, the individual may continue to struggle against the restraints, especially if he/she feels unable to breathe. This struggle increases the body's oxygen needs, further potentiating the dilemma. It also may invite the application of increased pressure by those restraining, further compromising ventilation (Morrison & Sadler, 2001, p. 48).

The issue of positional asphyxiation has been discussed extensively in the law enforcement community, particularly related to the hog-tie position (Chan, Vilke, Neuman, & Clausen, 1997, p. 579; Morrison & Sadler, 2001, p. 46; O'Halloran & Frank, 2000, p. 289; Paterson, et al., 1998, p. 62). Hog-tying refers to the restraint of a person in a prone position with his/her wrists and ankles bound together behind the back (O'Halloran & Frank, 2000, p. 39). This position compresses or restricts movement of the ribs, particularly if the hands are pulled firmly behind the back or if weight is applied to the individual's chest or back (Parkes, 2000, p. 40). One study showed that the hog-tie position can prolong recovery from exercise, specifically the duration of time it takes for the peripheral oxygen saturation and heart rate to return to normal (Reay, Howard, Fligner & Ward, 1988). Some law enforcement communities attempted to modify or ban the use of the hog-tie position (O'Halloran & Frank, 2000, p. 39). However, sudden deaths during prone restraint continue, suggesting that risks may be associated with the prone restraint itself, rather than entirely dependent upon the hog-tie position (O'Halloran & Frank, 2000, p. 39).

### **C. RESTRAINT AND VENOUS BLOOD RETURN**

Prone restraint and the associated chest immobilization may also directly impact the functioning of the heart. The left side of the heart (left ventricle) pumps oxygenated blood into the body. The right side of the heart receives venous blood back from the body's tissues and sends it into the lungs to expel carbon dioxide and pick up oxygen. The right atrium of the heart, which receives venous blood back for circulating in the body, is located midway between the vertebral column (or spine) and the sternum (or chest plate). When an individual is restrained prone, the right atrium is compressed. It is sandwiched between sternum and vertebral column. This limits the heart's capacity to receive blood return from the body. Meanwhile, the left side of the heart is still working, pumping blood into the brain and body as usual. With the blood not returning to the heart, it begins pooling in the tissues. When the pressure in the venous system builds up, it causes rupture of small venous branches resulting in small hemorrhages.

Small purplish hemorrhagic spots (petechiae) have long been considered corroborative evidence of asphyxia.<sup>8</sup> Petechiae appear when blood pools in the small veins (venules) and capillaries, due to an impairment or obstruction in venous blood return in the presence of continued arterial input (Ely & Hirsch, 2000, p. 1276). According to Dr. Spitz, inability to breathe alone increases venous pressure. A physical struggle that increases cardiac output and raises blood pressure also enhances the occurrence of petechiae (Ely & Hirsch, 2000).

#### **D. AGITATED OR EXCITED DELIRIUM**

Sudden deaths involving physical restraint have been associated with a syndrome called agitated delirium (O'Halloran & Frank, 2000; Paterson, et al., 1998; Stratton, et al., 2001). Agitated delirium (also known as excited delirium or acute excited states) is a condition of extreme mental and motor excitement characterized by aggressive activity with confused and unconnected thoughts, hallucinations, paranoid delusions and incoherent or meaningless speech (Farnham & Kennedy, 1997, p. 1107; O'Halloran & Lewman, 1993, p. 292; O'Halloran & Frank, 2000, p. 48).

Cardiac arrhythmia is the likely cause of unexpected deaths of restrained individuals with agitated delirium (O'Halloran & Lewman, 1993, p. 294). This cardiac arrhythmia is due to:

1. an insufficient oxygen supply to the heart and brain due to respiratory compromise (discussed above); and
2. release of catecholamines<sup>9</sup> which increases oxygen demand.

The state of agitated delirium and resulting confrontation with others releases a rush of catecholamines into the blood stream (Mohr & Mohr, 2000, p.

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<sup>8</sup> The prevalence of petechiae in the conjunctivae and eyelids is thought to be due to the relative lack of support/resistance offered by the surrounding tissues in and around the eye which would otherwise act to prevent or limit blood escaping from the veins into the surrounding tissue (Ely & Hirsch, 2000, p. 1276).

<sup>9</sup> Catecholamines, such as epinephrine and norepinephrine, are neurotransmitters (chemical messengers) that are released during periods of stress. They affect the nervous and cardiovascular systems, temperature and smooth muscle.

290; Morrison & Sadler, 2001, p. 48). A high level of catecholamines in the blood contributes to the development of an irregular and rapid heartbeat (ventricular tachyarrhythmia) (Mohr & Mohr, 2000, p. 290; Morrison & Sadler, 2001, p. 48). The arrhythmia is further exacerbated by decreased oxygen delivery to the heart muscle, brain and other tissues at a time of high oxygen demand. Ultimately, ventricular tachyarrhythmia may precipitate ventricular fibrillation (uncoordinated flutter or quivering of the heart muscle), cardiac arrest and death.

## **E. CONTRIBUTION OF MEDICATION**

The use of antidepressant and antipsychotic medication, in particular phenothiazines, has been associated with sudden deaths. However, no causal connection has been established (Kumar, 1997, p. 172-173; Morrison & Sadler, 2001, p. 48-49). Some psychotropic medications depress central nervous system activity (Mohr & Mohr, 2000, p. 289). Certain psychotropic medications, including phenothiazines, lithium carbonate and other psychoactive drugs, have been linked to changes in the electrocardiogram (EKG) (Kumar, 1997, p. 173; Laposata, Hale & Poklis, 1998, p. 434; Mohr & Mohr, 2000, p. 290). The stress of being placed in restraints in conjunction with the effects of these medications may be deadly (Mohr & Mohr, 2000, p. 291). But any causal link between psychoactive drug use and sudden death remains tenuous (Kumar, 1997, p. 173; Laposata, et al., 1998, p. 439).

## VI. RESTRAINT TRAINING PROGRAMS

Many restraint and de-escalation training programs include techniques for restraining agitated individuals prone. The Professional Assault Response Training (PART) 2000 training manual describes four manual restraint techniques, including “*floor-assisted prone restraint, ... the most restrictive and intrusive method of manual restraint taught in the PART basic workshop.*” However, the PART manual fails to adequately warn about the hazards of positional asphyxiation with prone restraint.

*There are realistic risks of injury to both the restrained individual and employees during floor-assisted prone restraint. The greatest risk of injury seems to be during the period the restrained individual is being assisted to the floor from a standing position. The restrained individual often suffers bumps, scrapes, small bruises, and small cuts from impact with the floor. Employees suffer similar injuries. . .*

*The restraint team should avoid any position that puts pressure across the attacker’s torso, long bones, joints, spinal cord. Care should also be taken to avoid contact with sexual areas (Smith, 2000, chap. 7).*

Management of Assaultive Behavior (MAB) training, provided to staff in California State Hospitals, advises staff of problems associated with prone restraint. None specifically address positional asphyxiation. The MAB manual notes the following tips to avoid difficulties:

*Contain patients with their face/stomach to surface used (wall/floor/bed) to enhance protection for patient and staff. This aids in minimizing patient’s range of motion, may aid in focusing disoriented patients and lessen agitation; allows for protection of vulnerable sites.*

*Utilize combined weight of staff against patient’s strength; don’t try to out-muscle patient.*

*Eliminate slack between you and patient; slack creates space that allows for unpredictable movement to work against you; hug/crowd- in; no long bones on long bones (California Department of Mental Health [CA DMH] Staff Manual, 1991, p. 65;CA DMH Instructor Manual, 1991, p. 69).*

## VII. PAI's INVESTIGATIONS

PAI's Investigations Unit conducted investigations into each of the cases described above. The first four cases were forwarded to Werner U. Spitz, M.D., a forensic pathologist, board certified in Pathologic Anatomy and Forensic Pathology and an expert in excited delirium and positional asphyxia. In each of those cases, Dr. Spitz concluded that the prone restraint position was a significant contributing factor to the demise of individuals restrained.

The suddenness of an individual's death following prone restraint is not surprising. Any individual's respiratory capacity will be compromised when restrained prone for a sufficient duration of time, although certain characteristics are associated with injury and death. According to Dr. Spitz, "timing does not matter." One can only go for a minute or two without breathing before running into difficulties. In reviewing the cases above, Dr. Spitz concluded that Anthony survived while the others died simply due to the duration of the prone restraint and his relatively smaller body mass.

Six of the victims described in this report were obese or had an excessive body mass index. Dr. Spitz also described the added effect of obesity:

*There is a greater chance of [positional asphyxia] with greater body mass and with an enlarged heart. [Crystal] had a layer of fat under her navel about 3½ inches. Normal is minimal. The amount of fat under the navel indicates the thickness of the fat layer under the skin. Such thick fat layer will be associated with excess fat inside the abdominal cavity. In the prone position, the excess fat, together with the organs, pushes against the diaphragm causing it to be immobilized, which interferes with breathing.*

PAI also consulted with Randall Hines, a restraint expert with over twenty-five years of experience in restraint and containment in psychiatric and corrections facilities. Mr. Hines trains a broad range of facility staff in non-physical de-escalation techniques. He has also served as an expert witness in numerous restraint-related death cases in state and federal courts.

With one exception, PAI's investigations did not reveal departure in technique from the restraint training staff received. Furthermore, all staff involved in each restraint were current in their restraint certification. The difficulty is staff failed to appreciate the potential cardiac and respiratory hazard of restraining individuals prone.

Staff typically default to the most restrictive mode of containment or restraint, prone, particularly following an aggressive episode. According to one nurse who assisted with Norman's restraint:

*Nurse: We did just what we would normally do. They did the normal protocol type – the way we normally take down someone.*

*PAI: He was face down, wasn't he?*

*Nurse: Yes. Which is normal protocol. What we do when we put a patient in restraints, in 5-point restraints, what we do is put patients in restraints on their stomach. That's how we restrain patients and that's been the way we've done it for years.*

Later:

*Nurse: It doesn't matter how big they are, they still go prone, right? I mean what else could you do? When they're prone, they can't exert more defenses against you than if they're supine. That's the catch 22 of that.*

One PAI investigator summarized the dilemma. *"Staff did everything by the book. The problem is the book is wrong."*

## VIII. FINDINGS AND CONCLUSIONS

### **A. EACH OF THE DEATHS OR INJURIES DESCRIBED ABOVE WAS LIKELY DUE TO POSITIONAL ASPHYXIATION DUE TO PRONE RESTRAINT OR CONTAINMENT.**

PAI's medical expert, Dr. Spitz, concluded that the outcome in each of the cases that he reviewed was entirely attributable to the position of restraint or containment:

*Pushing the abdominal contents up to the vertebral column sandwiches them between the floor and the pelvis. They press up against the diaphragm and you can't breathe. This causes sudden death.*

Dr. Spitz discussed the problems with a prone restraint position when combined with an agitated state:

*You have a struggle. The more agitated you are, the more you need to breathe. You have a condition where more oxygen is required; more air is needed. The tissues use more oxygen because they work harder. Now, you take him and put him face down, restrained face down. That will afford him less ability to expand the bellows – to breathe. And will interfere to some extent with his ability to breathe fully, to satisfy the need of the tissues. The more agitated you are, the less time it takes [to suffocate].*

### **B. PRONE IS A HAZARDOUS AND POTENTIALLY LETHAL RESTRAINT POSITION, PARTICULARLY FOR INDIVIDUALS WHO ARE OVERWEIGHT OR WHO HAVE BEEN AGITATED AND STRUGGLING.**

Current medical literature shows that restraining a person prone is extremely hazardous and may be deadly. Research studies and the literature have suggested a combination of factors that place a person at risk of positional asphyxia. They include prone position during restraint, agitated delirium syndrome, obesity, and a prolonged struggle or physical exertion. The mechanism of death is a sudden fatal cardiac arrhythmia or respiratory arrest due to a combination of factors causing decreased oxygen delivery at a time of increased oxygen demand.



The Joint Commission on Accreditation of Health Care Facilities (JCAHO)<sup>10</sup> issued a Sentinel Event Alert in November, 1998. In the summary of 20 restraint-related death reviews, the JCAHO stated:

*In 40 percent of the cases, the cause of death was asphyxiation. Asphyxiation was related to factors such as putting excessive weight on the back of the patient in a prone position... Two-point, four-point or five-point restraints were used on extremities in 40 percent of the cases related to restraint deaths. A therapeutic hold was used in 30 percent of the cases.... Restraining a patient in prone position may predispose the patient to suffocation (p. 1).*

Each of the cases described in this report implicates these hazards. In each case, prone restraint or containment followed a period of aggression or struggle. The victims were placed prone and, shortly thereafter, stopped breathing – a terminal outcome for all.

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<sup>10</sup> The JCAHO is a private health care accreditation organization that evaluates and accredits nearly 18,000 healthcare organizations and programs in the United States, approximately 80% of healthcare facilities in the country. Its surveys are recognized by CMS so if a healthcare facility is accredited by JCAHO, it is deemed that they have met all of CMS' standards and is eligible to receive Medicare and Medicaid financing.

## **IX. RECOMMENDATIONS**

### **A. INDIVIDUALS MUST NEVER BE PLACED IN THE PRONE POSITION WHEN RESTRAINED.**

Acute excited states and patient aggression should be regarded as a psychiatric emergency. Restraint in these cases has an associated mortality (Morrison & Sadler, 2001, p. 49). Studies have concluded that restraint position is a factor in death during restraint (Parkes, 2000). Given the risk of positional asphyxiation with prone restraint, many experts in the field advise clinicians and others executing restraint never to mechanically restrain prone persons at risk on a restraint bed.

Clinicians are urged to use alternatives to prone restraint. These include:

#### **- USING AN ALTERNATE RESTRAINT POSITION**

Experts in the field have advised using many alternative containment techniques, including placing persons on their side or standing facing a wall. When mechanically restraining an individual to a bed, staff should position him/her supine rather than prone. While clinicians have been cautioned about the risk of aspiration with the supine position, the literature does not corroborate this risk to be as substantial as the risk of asphyxiation with prone restraint. In contrast, many studies find that an agitated, resistive patient's breathing is more compromised in the prone position than in the supine position (Parkes, 2000).

According to Randall Hines, *“No type of restraint is completely safe is the bottom line, however face up is safer. Neither [face up or face down] is recommended as a safe practice.”*

#### **- PLACING PERSONS IN SECLUSION RATHER THAN RESTRAINT**

Unless an individual is at imminent risk of self-injury, clinicians are urged to consider the use of seclusion alone, rather than restraint. Researchers suggest that it may be safer to seclude a patient than use restraint (Parkes, 2000, p. 43). Of course, there are risks associated with seclusion. Moving persons into seclusion is a high risk practice. Patients in seclusion must be continuously monitored, including frequent face to face interactions, to ensure safety and rapid response to potentially adverse conditions.

**B. TEMPORARY PRONE CONTAINMENT SHOULD ONLY BE ATTEMPTED WHEN ALL OTHER TECHNIQUES ARE INEFFECTIVE TO PREVENT IMMINENT SERIOUS HARM, AND WHEN THERE ARE SUFFICIENT SAFEGUARDS IN PLACE TO PROTECT THE INDIVIDUAL FROM POSITIONAL ASPHYXIATION.**

Temporary physical prone containment should only be used when other techniques of intervention have been tried and failed. Prone containment should never be used for persons at risk for positional asphyxiation, including those with obesity and those in an agitated, excited state.

Prone containment may include takedown maneuvers, or techniques for taking a person from standing to laying for purposes of containment or restraint. Randall Hines recommends against takedown maneuvers which force a person to the floor. Appropriate techniques include following the person to the floor when restraint standing is no longer possible, such as when off balance or when lowering an individual to the floor.

During prone containment, care must be taken to not place any pressure or weight on the individual's chest, back, lungs, diaphragm, or stomach. This restricts the individual's ability to breath and further compromises his/her respiratory and cardiac functioning.

Randall Hines recommends requiring an observer whenever attempting prone containment. The observer is responsible for monitoring all the persons involved, giving direction to protect all people from possible danger or harm. The safety of the individual being restrained is paramount. The observer must always be watching the individual closely, including observing for signs of respiratory compromise. The duration of the containment must be limited to the time that the individual poses an imminent risk of serious harm. Once the imminent threat of injury has abated, the containment must be released.

### **C. RESTRAINT AND CONTAINMENT MUST BE VIEWED AS THE RESULT OF A TREATMENT FAILURE, NOT A TREATMENT INTERVENTION.**

For years, regulatory and accreditation agencies and lawmakers have attempted to limit the use of restraints.<sup>11</sup> In recent years, CMS and the JCAHO, among other organizations, have issued more stringent regulations pertaining to the use of behavioral restraints. CMS regulations and JCAHO standards require that restraint only be used in emergency situations if needed to ensure the patient's physical safety and when less restrictive alternatives have been determined ineffective. All organizations using restraint must implement procedures to exclude the use of physical or mechanical restraint unless absolutely necessary to safeguard individuals from imminent serious physical harm.

However, research confirms there is little significant reduction in the use of restraints absent changing the philosophy of health care providers from one of viewing restraint as a treatment option to considering the use of restraint as a treatment failure. Similar to a "code blue"<sup>12</sup> in a medical setting, restraint should never be a planned intervention but rather an emergency measure of last resort to avoid imminent risk of serious harm or death.

Facilities that have embraced the concept that restraint is the result of a treatment failure have seen dramatic reductions in the frequency and duration of restraint use. In 1997, the Pennsylvania Department of Public Welfare instituted an aggressive program to reduce and ultimately eliminate seclusion and restraint in its nine state hospitals. This program is touted as having the highest standards for

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<sup>11</sup> In its introduction to standards pertaining to the use of restraint and seclusion for behavioral health patients, JCAHO states:

*Creating a physical, social, and cultural environment limiting restraint and seclusion use to clinically appropriate and adequately justified situations or that actually reduces their use through preventive or alternative strategies helps organization staff focus on the patient's well-being. The leaders' role is to help create such an environment (JCAHO, 2000, p. 124)*

*The CMS preamble to the 1999 standards for hospitals states, 'the patient's right to be free from restraint is paramount.' (Federal Register, 1999, p. 36078).*

<sup>12</sup> A "code blue" refers to an unplanned medical crisis or emergency in an acute care setting requiring immediate medical intervention to prevent serious and lasting injury or death (e.g. a cardiac arrest requiring advanced life support).

seclusion and restraint in the nation. After three years, Pennsylvania reduced incidents of seclusion and restraint (frequency) by 74% and reduced the number of hours patients spent in seclusion and restraint (duration) by 96% (Pennsylvania Department of Public Welfare [PA DPW], 2000, Q17).

Among the key elements to Pennsylvania's seclusion and restraint reduction program are the following principles:

- Seclusion/restraint are safety measures, not therapeutic techniques, which should be implemented in a careful manner.
- Seclusion/restraint are exceptional and extreme practices for any patient. They are not to be used as a substitute for treatment....
- The treatment plan includes specific interventions to avoid seclusion/restraint.

In Pennsylvania, the initiative changed the prevailing culture of inpatient psychiatric care. Seclusion and restraint are no longer considered the acceptable response to aggressive or self-injurious patient episodes. Consequently, staff are encouraged to pay systematic attention to the specific precipitants and contexts of assaultive and self-injurious behavior, and to help the consumer to creatively resolve or avoid such situations. The initiative requires staff to create a partnership with patients and actively engage them in the treatment process rather than rely on physical force and coercion to control patient behavior (PA DPW, 2000, Q2 §5).

This paradigm shift includes retraining staff about the causes of aggressive behavior and how best to intervene. According to Randall Hines, considering restraints as an intervention invites staff to misdirect the focus from the real issue - the cause of the aggressive behavior. Resorting to restraints demonstrates missed opportunities for staff to intervene with issues that are triggering the aggressive behavior – the true or underlying message the behavior is really communicating. Randall Hines explains:

*All behavior, whether it's violent or not, is communication. And it means something. Generally, staff do not understand the meaning of behavior nor do they adjust their interactions to prevent violence. It's about understanding the causes and needs of each person. If we're confident and knowledgeable in what's going on*

*with people, know the right questions to ask, understand what their fear-based responses are going to be, we can create an environment where they feel safe.*

*Restraints are only necessary in a climate of fear. This idea applies to everyone: staff, patients and clients. If you reduce the level of fear, you will reduce the need for [restraints].*

*Restraints are not a treatment failure because they aren't treatment. Restraints represent a failure to understand violent behavior. We react with restraints because it is all that we understand. We don't understand the bigger picture about what's going on with the person. It's a failure to understand rather than a failure to treat.*

*The solution is in the relationship between the staff and the acting out person. What makes programs work is when staff begin to have insights about how they're dealing with people. It causes a change in the culture. They change the way they behave towards their clients and, thus, their relationships change.*

Staff must not simply respond to the behavior but must work to understand what the behavior means. Direct care staff must be trained to intervene early in the escalation cycle with verbal and non-verbal de-escalation techniques. Staff must regularly interact with patients – be with the patients. Insufficient contact with patients hampers opportunities to observe the initial signs of impending aggressive behavior (Mohr & Mohr, 2000, p. 292). Staff must conduct regular and meaningful assessments of a patient's current condition. This assists caregivers to recognize a potentially escalating situation, intervene in the situation and monitor for adverse effects related to the situation and the intervention (Mohr & Mohr, 2000, p. 292).

According to Randall Hines,

*When it comes to restraint, the question is, "Are they presenting an imminent danger to themselves or others?" Restraint should only be used when alternatives have been tried and failed. And there's an imminent danger or risk of serious injury or death.*

Trying less restrictive alternatives does not mean attempting a complex series of interventions or a lengthy checklist of steps to initiate before laying hands

on the individual. Rather, a whole toolbox of possible interventions are implemented during the course of the interaction and modified based upon the assessment of the individual's response. According to Randall Hines,

*Intervention is anything along a continuum from just a physical presence or a voice directive to actually physically placing your hands on the person. There isn't just one intervention. There is a continuum, even when the individual is [in the peak of the violence cycle]. Those judgments need to be made by the staff who have the best knowledge and relationship with the acting out person.*

*For example, let's say you have somebody...throwing chairs across the room. And you walk into the room...and say, "Stop! Don't throw any more chairs." And they stop throwing chairs. You've had a successful lesser restrictive intervention. Now, same scenario. You walk in and you say, "Stop!" And they don't stop. You approach them. In other words, you decrease your distance and you watch their behavior and see what happens. Do they become more violent? Or are they starting to de-escalate... And if they're escalating, you back off, using all of the skills along the intervention continuum.*

Randall Hines reports that many organizations in recent years have been successful in eliminating prone containment by changing the paradigm regarding use of restraints. These organizations have included a formal debriefing process (also known as critical incident debriefing) following all restraint events in which staff discuss the patient behavioral antecedents and their responses as a part of the program for reducing and preventing restraints. Similarly, the Pennsylvania initiative recognized the importance of critical incident debriefing with the following program requirement:

**- Patients and staff must be debriefed after every incident, and treatment plans must be revised (PA DPW, 2000, Q1).**

Facility leadership must embrace the change in culture to create such a paradigm shift at the staff level. The JCAHO's restraint standards for hospitals emphasize the necessity for commitment by the organization's administrators:

*TX.7.1.1 Organization leaders support limited, justified use of restraint or seclusion through appropriate...*

*TX.7.1.1.3 Staff orientation and education creating a culture emphasizing prevention and appropriate use and encouraging alternatives (JCAHO, 2000, p. 124-126).*

The Pennsylvania initiative had “strong, clearly articulated leadership commitment. Staff at all levels of the organization are invested in the project’s success.”

**D. ALL FIRST RESPONDERS MUST BE EDUCATED REGARDING THE RISKS OF POSITIONAL ASPHYXIATION WITH PRONE RESTRAINT.**

Restraint training techniques must be revised to prohibit prone mechanical restraint and to train staff regarding the hazards of the prone position with emergency containment. While certain characteristics are associated with injury and death, any individual’s respiratory capacity will be compromised when restrained prone for a sufficient duration of time. Training programs must caution staff regarding the extreme risks associated with prone restraint.

Training should also include interventions for reducing the risk of death or other adverse outcomes with prone containment. This includes requiring an observer with every prone containment, rapidly moving a subject face up if any signs of distress are detected and into a safer position as rapidly as possible (Parkes, 2000; Paterson, et al., 1998). Clinicians must be cautioned to avoid direct neck or chest pressure (Morrison & Sadler, 2001). Experts also advise careful consideration of necessity before emergency administration of phenothiazines (Kumar, 1997). The restraint must be terminated at any sign of impending cardiopulmonary arrest including the onset of shallow or labored breathing or the cessation of struggle against the restraint.

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